Figure 1.

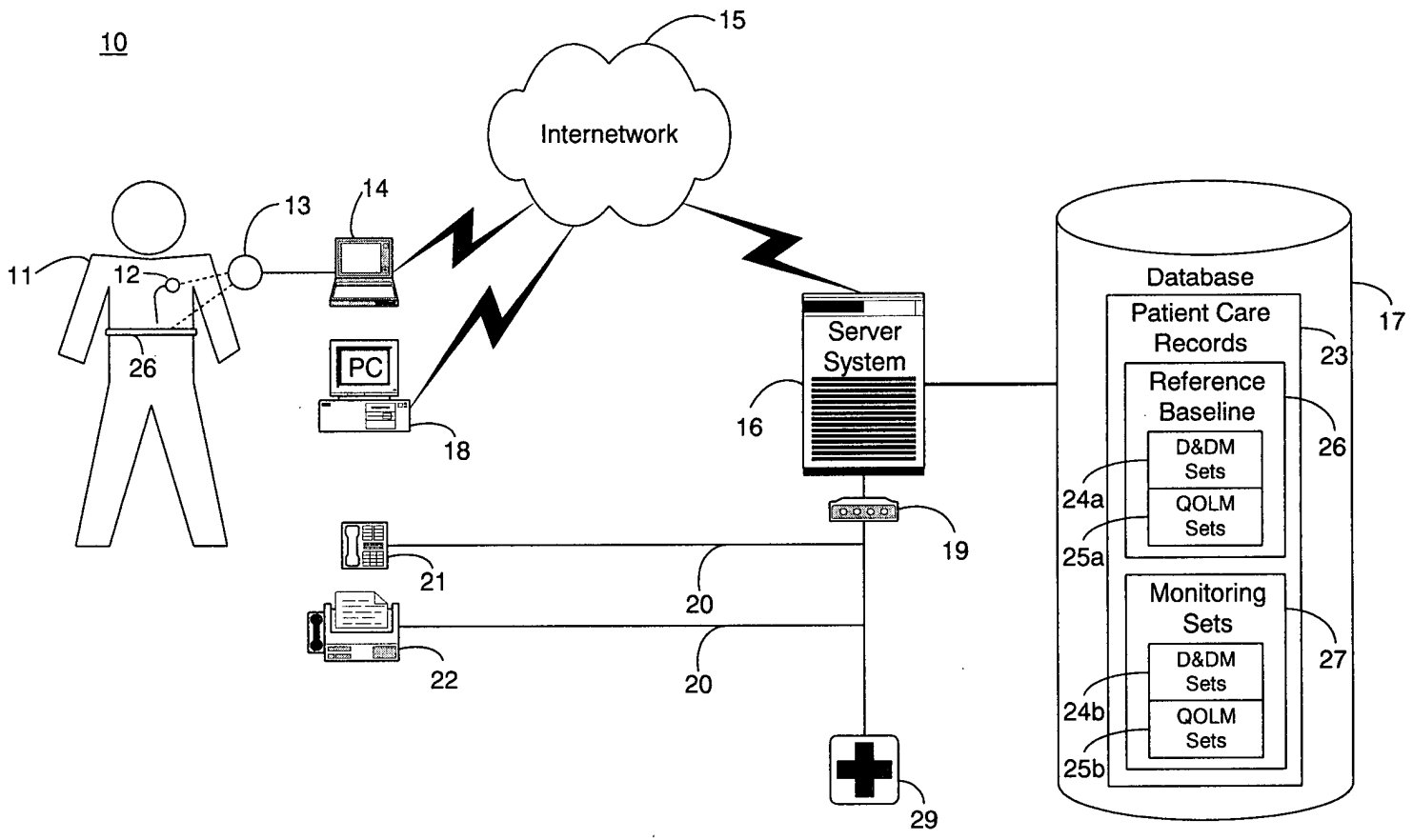

10
15
Internetwork
11
12
13
14
26
PC
18
16
Server System
19
21
20
22
20
29
Database
17
Patient Care Records
23
Reference Baseline
26
D&DM Sets
QOLM Sets
24a
25a
Monitoring Sets
27
D&DM Sets
QOLM Sets
24b
25b

Figure 2.

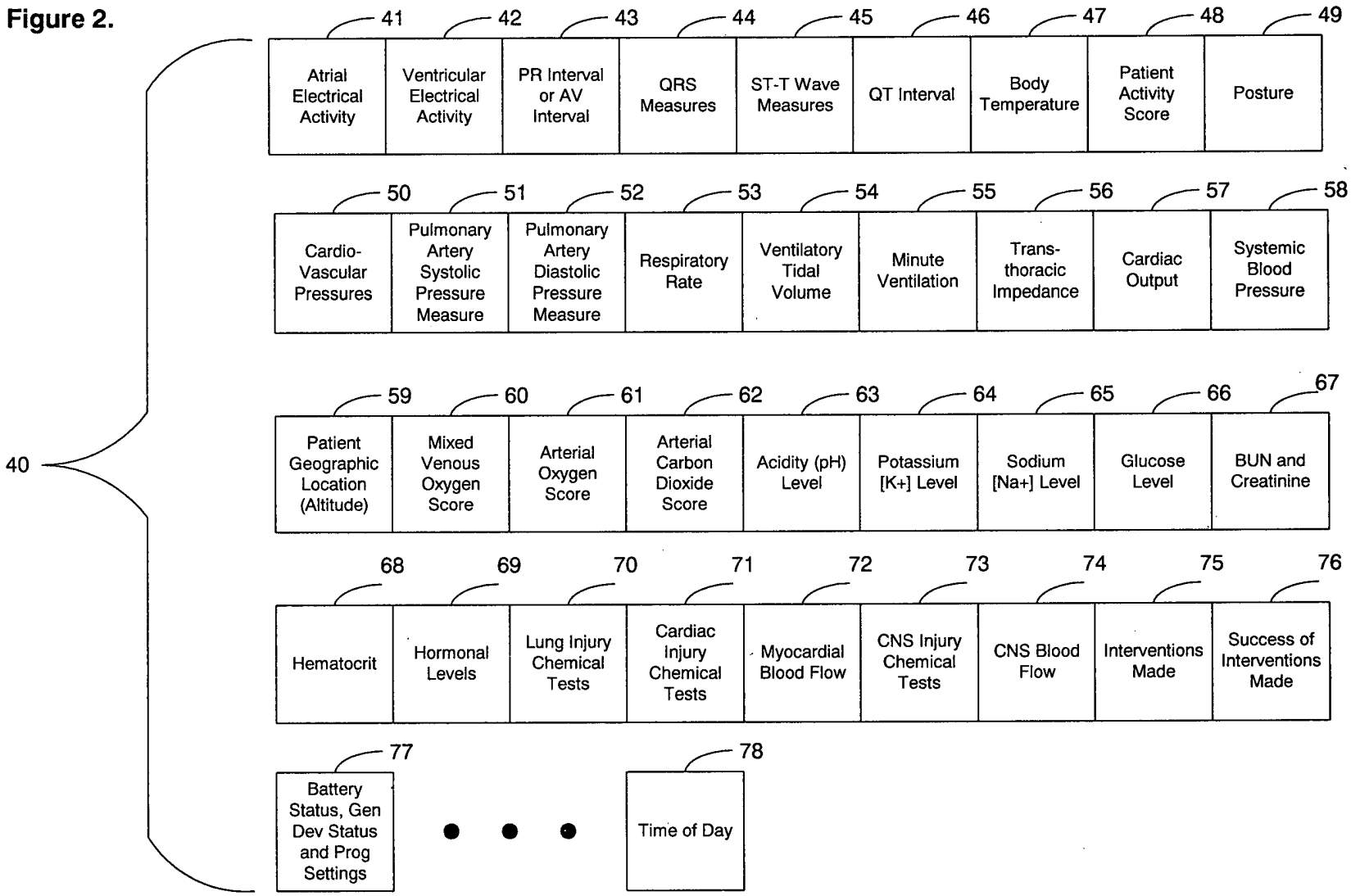

40
41
Atrial Electrical Activity
42
Ventricular Electrical Activity
43
PR Interval or AV Interval
44
QRS Measures
45
ST-T Wave Measures
46
QT Interval
47
Body Temperature
48
Patient Activity Score
49
Posture
50
Cardio-Vascular Pressures
51
Pulmonary Artery Systolic Pressure Measure
52
Pulmonary Artery Diastolic Pressure Measure
53
Respiratory Rate
54
Ventilatory Tidal Volume
55
Minute Ventilation
56
Trans-thoracic Impedance
57
Cardiac Output
58
Systemic Blood Pressure
59
Patient Geographic Location (Altitude)
60
Mixed Venous Oxygen Score
61
Arterial Oxygen Score
62
Arterial Carbon Dioxide Score
63
Acidity (pH) Level
64
Potassium [K+] Level
65
Sodium [Na+] Level
66
Glucose Level
67
BUN and Creatinine
68
Hematocrit
69
Hormonal Levels
70
Lung Injury Chemical Tests
71
Cardiac Injury Chemical Tests
72
Myocardial Blood Flow
73
CNS Injury Chemical Tests
74
CNS Blood Flow
75
Interventions Made
76
Success of Interventions Made
77
Battery Status, Gen Dev Status and Prog Settings
78
Time of Day

Figure 3.

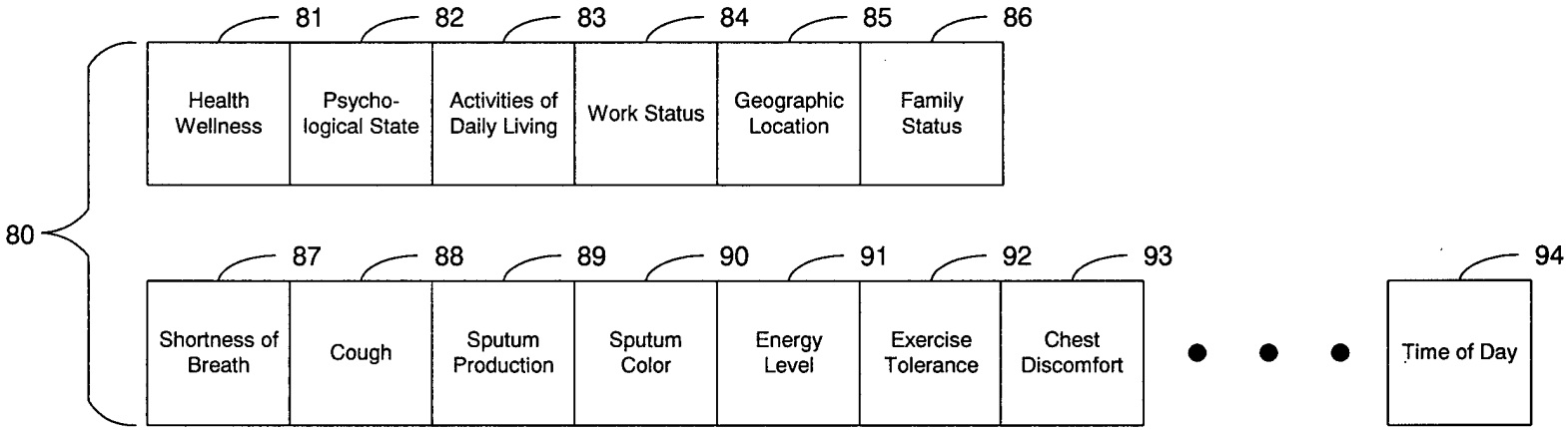

80
81
Health Wellness
82
Psycho-logical State
83
Activities of Daily Living
84
Work Status
85
Geographic Location
86
Family Status
87
Shortness of Breath
88
Cough
89
Sputum Production
90
Sputum Color
91
Energy Level
92
Exercise Tolerance
93
Chest Discomfort
94
Time of Day

Figure 4.

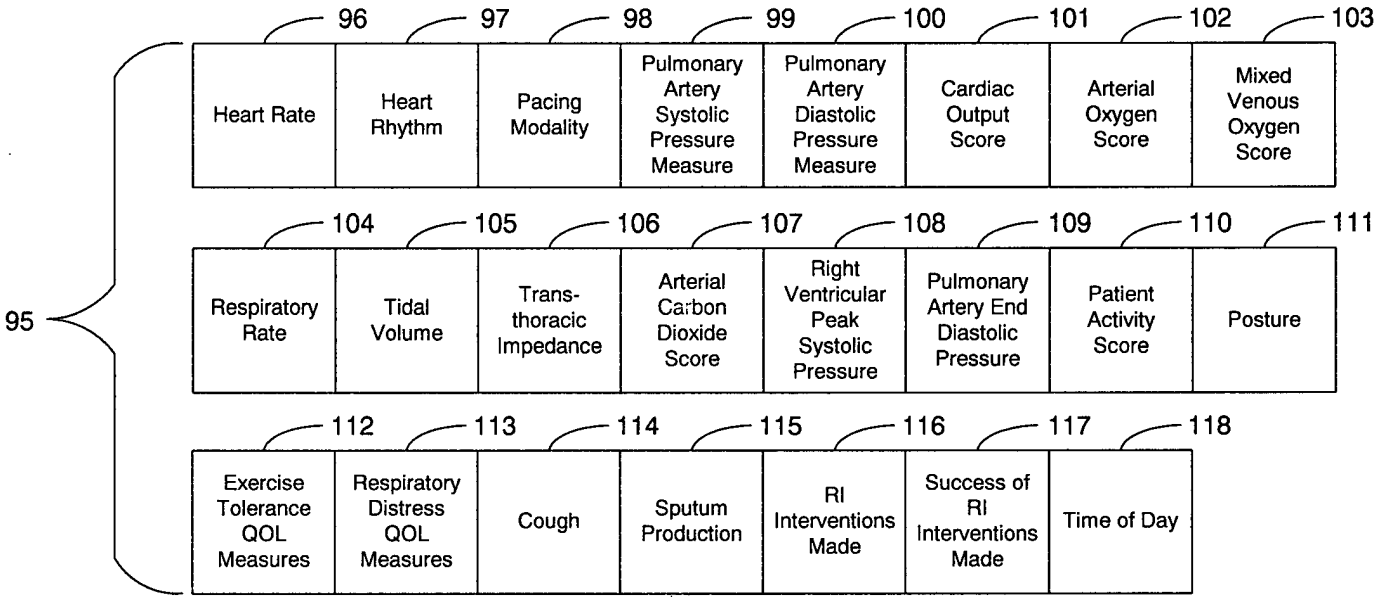

95
96
Heart Rate
97
Heart Rhythm
98
Pacing Modality
99
Pulmonary Artery Systolic Pressure Measure
100
Pulmonary Artery Diastolic Pressure Measure
101
Cardiac Output Score
102
Arterial Oxygen Score
103
Mixed Venous Oxygen Score
104
Respiratory Rate
105
Tidal Volume
106
Trans-thoracic Impedance
107
Arterial Carbon Dioxide Score
108
Right Ventricular Peak Systolic Pressure
109
Pulmonary Artery End Diastolic Pressure
110
Patient Activity Score
111
Posture
112
Exercise Tolerance QOL Measures
113
Respiratory Distress QOL Measures
114
Cough
115
Sputum Production
116
RI Interventions Made
117
Success of RI Interventions Made
118
Time of Day

Figure 5.

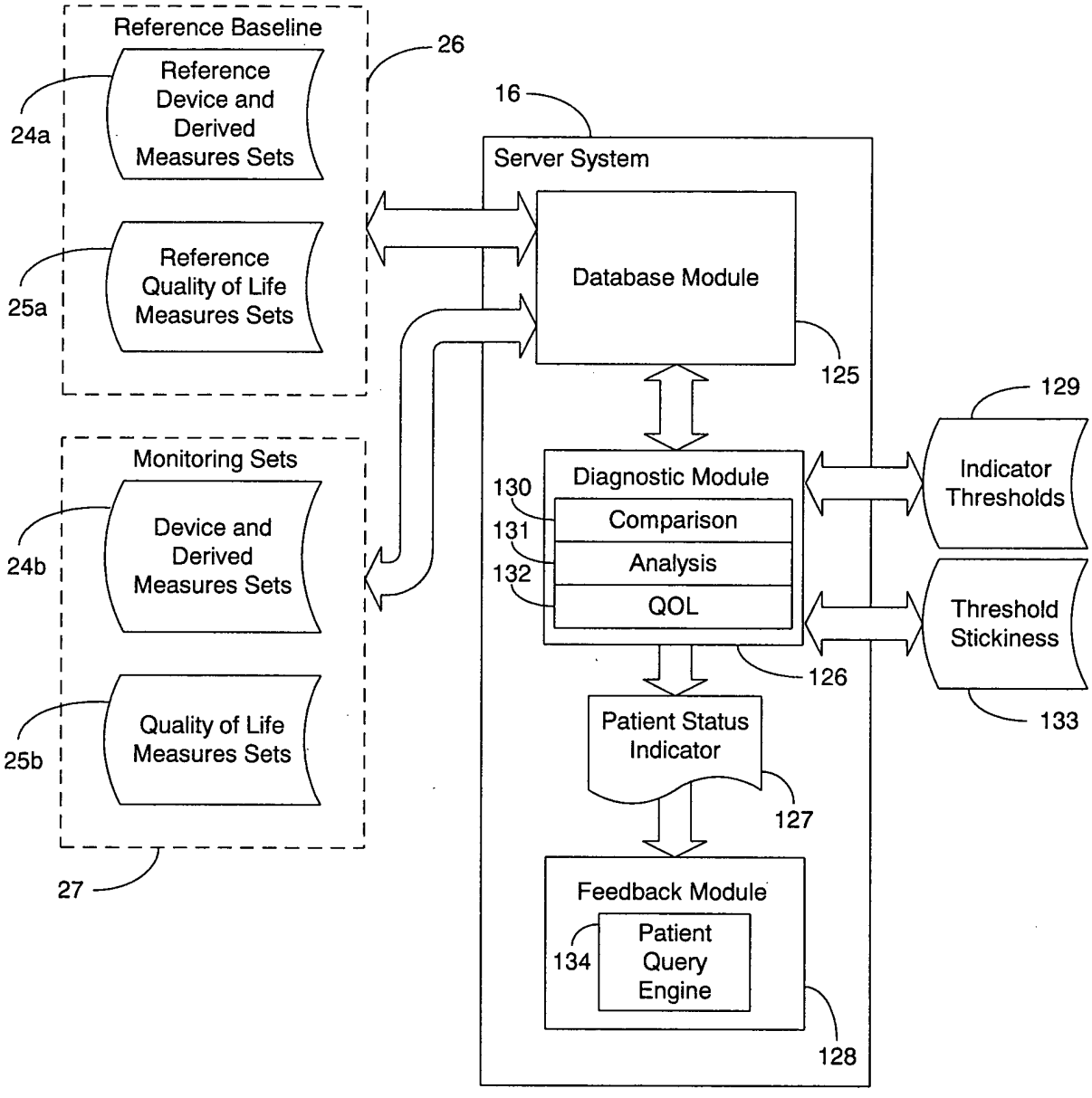

Reference Baseline
26
16
Reference Device and Derived Measures Sets
24a
Server System
Reference Quality of Life Measures Sets
25a
Database Module
125
129
Monitoring Sets
Diagnostic Module
130
Indicator Thresholds
Device and Derived Measures Sets
24b
131
Comparison
Analysis
132
QOL
Threshold Stickiness
126
133
Patient Status Indicator
Quality of Life Measures Sets
25b
127
Feedback Module
Patient Query Engine
134
27
128

Figure 6.

Patient 1

Set 0				Set n-2	Set n-1	Set n
X_0	•	•	•	X_{n-2}	X_{n-1}	X_n
Y_0	•	•	•	Y_{n-2}	Y_{n-1}	Y_n
Z_0	•	•	•	Z_{n-2}	Z_{n-1}	Z_n

time →

Patient 2

Set 0				Set n-2	Set n-1	Set n
$X_{0'}$	•	•	•	$X_{n-2'}$	$X_{n-1'}$	$X_{n'}$
$Y_{0'}$	•	•	•	$Y_{n-2'}$	$Y_{n-1'}$	$Y_{n'}$
$Z_{0'}$	•	•	•	$Z_{n-2'}$	$Z_{n-1'}$	$Z_{n'}$

time →

Patient 3

Set 0				Set n-2	Set n-1	Set n
$X_{0''}$	•	•	•	$X_{n-2''}$	$X_{n-1''}$	$X_{n''}$
$Y_{0''}$	•	•	•	$Y_{n-2''}$	$Y_{n-1''}$	$Y_{n''}$
$Z_{0''}$	•	•	•	$Z_{n-2''}$	$Z_{n-1''}$	$Z_{n''}$

time →

Figure 7.

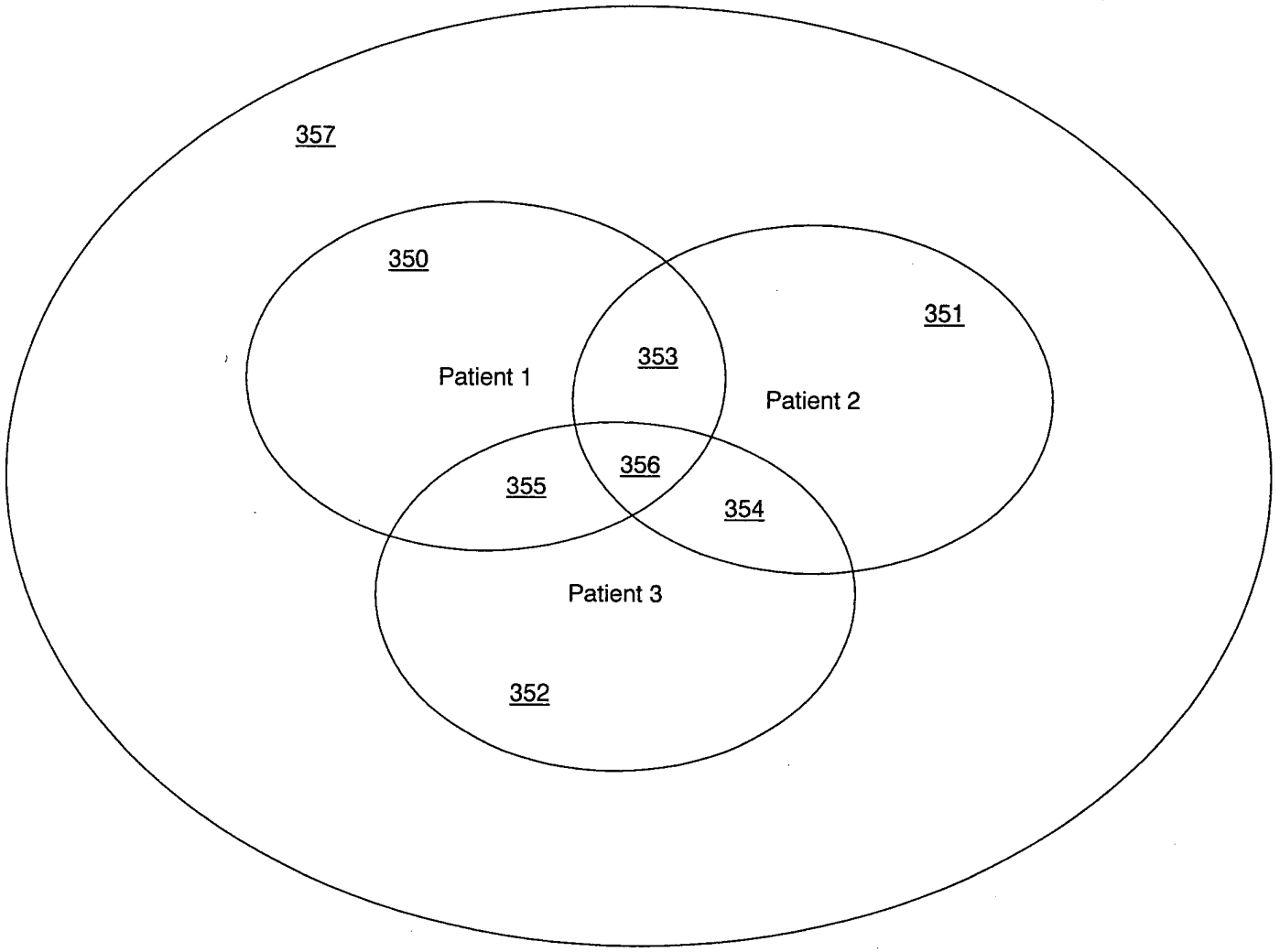


Figure 8A.

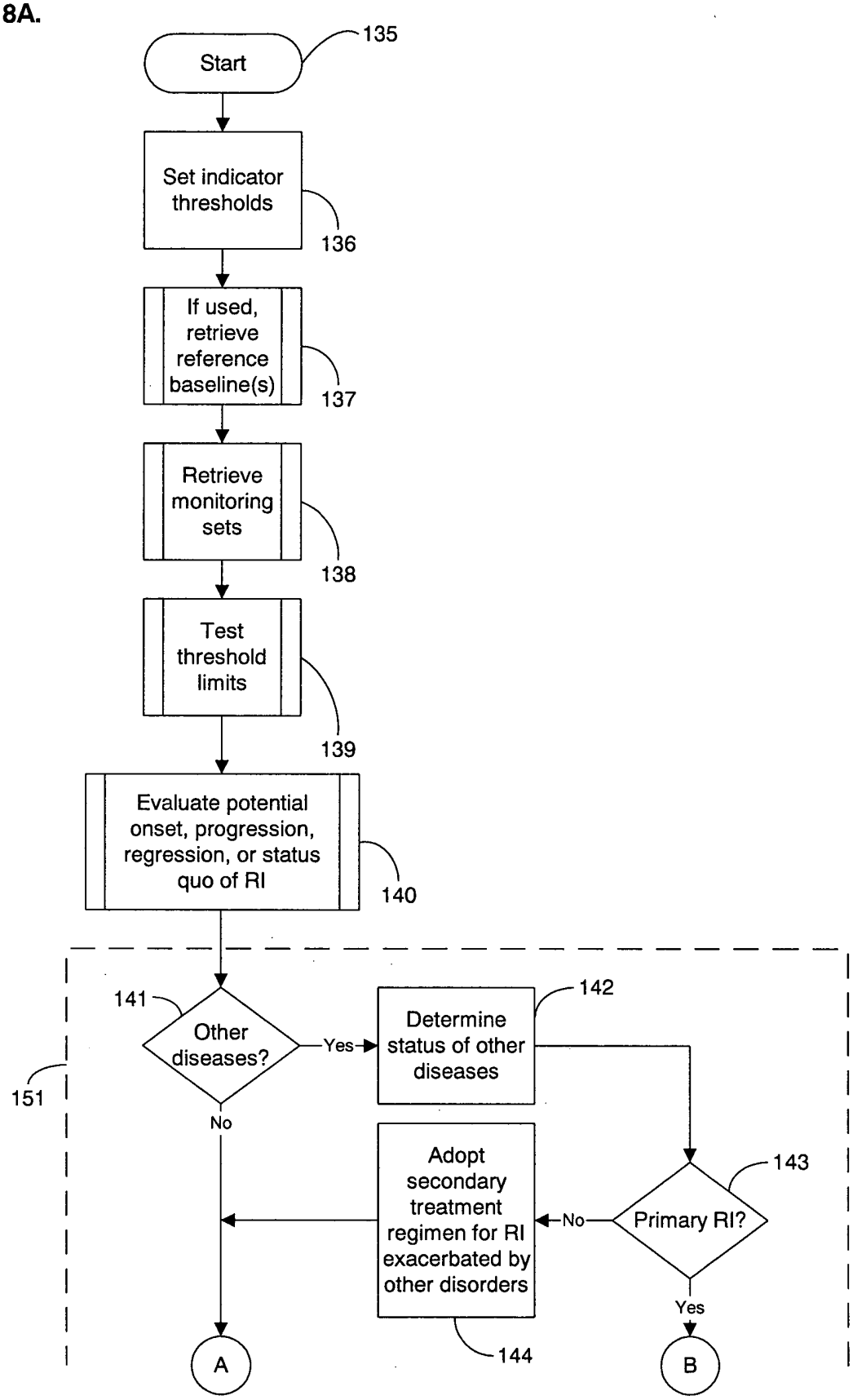

Start
135
Set indicator thresholds
136
If used, retrieve reference baseline(s)
137
Retrieve monitoring sets
138
Test threshold limits
139
Evaluate potential onset, progression, regression, or status quo of RI
140
141
Other diseases?
Yes
No
142
Determine status of other diseases
143
Primary RI?
No
Yes
Adopt secondary treatment regimen for RI exacerbated by other disorders
144
151
A
B

Figure 8B.

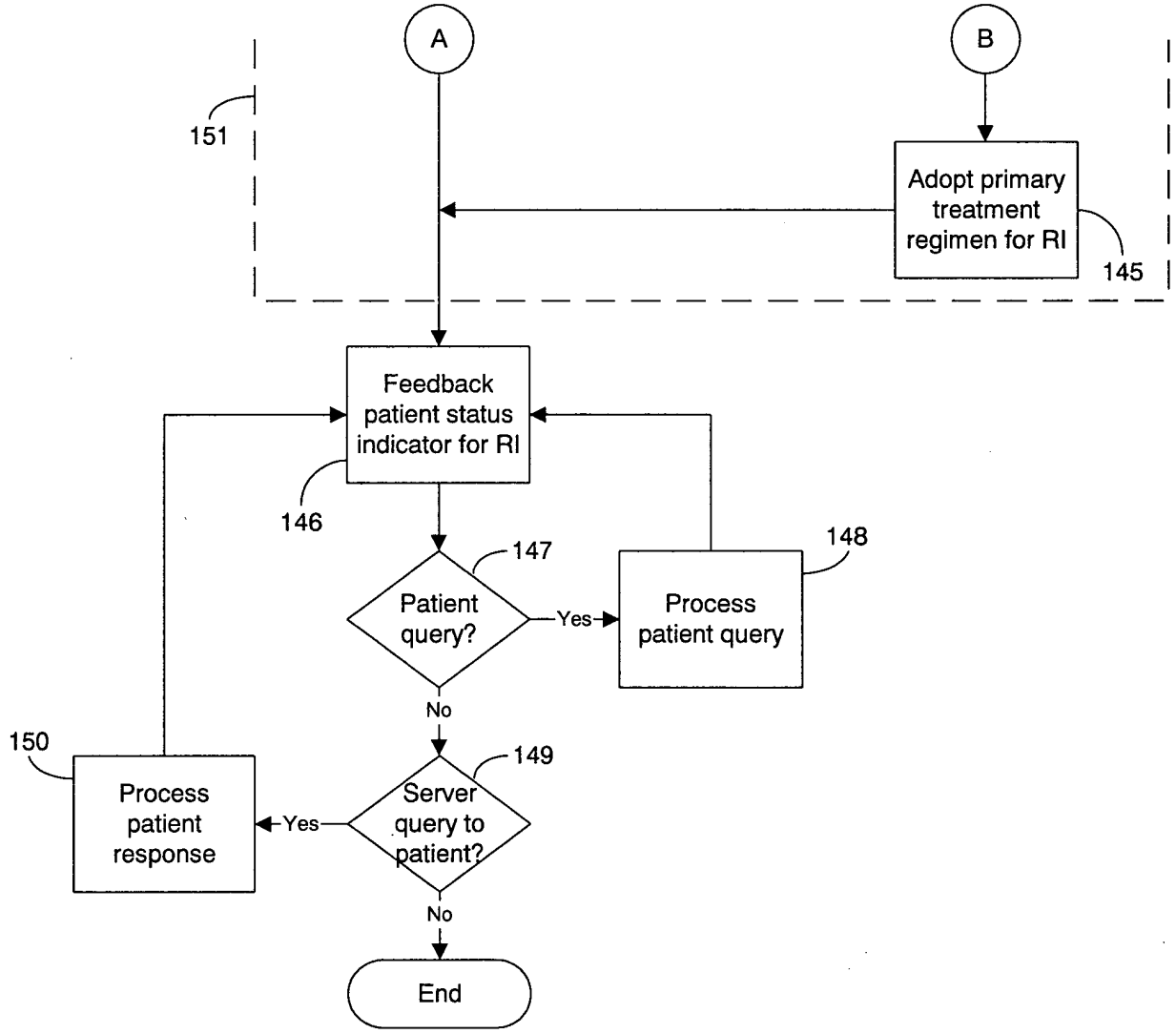

A
B
151
Adopt primary treatment regimen for RI
145
Feedback patient status indicator for RI
146
147
Patient query?
Yes
Process patient query
148
No
150
149
Process patient response
Yes
Server query to patient?
No
End

Figure 9.

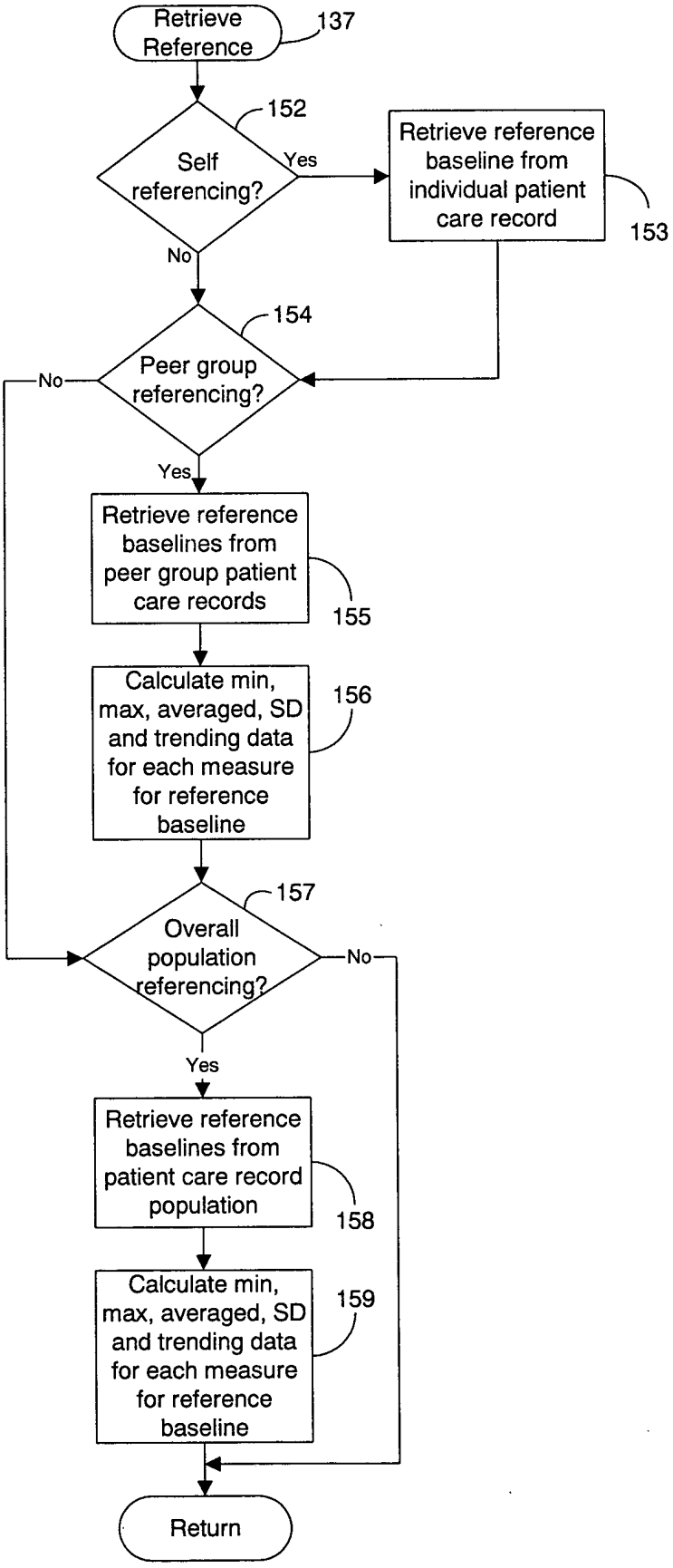

Retrieve Reference
137
152
Self referencing?
Yes
Retrieve reference baseline from individual patient care record
153
No
154
Peer group referencing?
No
Yes
Retrieve reference baselines from peer group patient care records
155
Calculate min, max, averaged, SD and trending data for each measure for reference baseline
156
157
Overall population referencing?
No
Yes
Retrieve reference baselines from patient care record population
158
Calculate min, max, averaged, SD and trending data for each measure for reference baseline
159
Return

Figure 10.

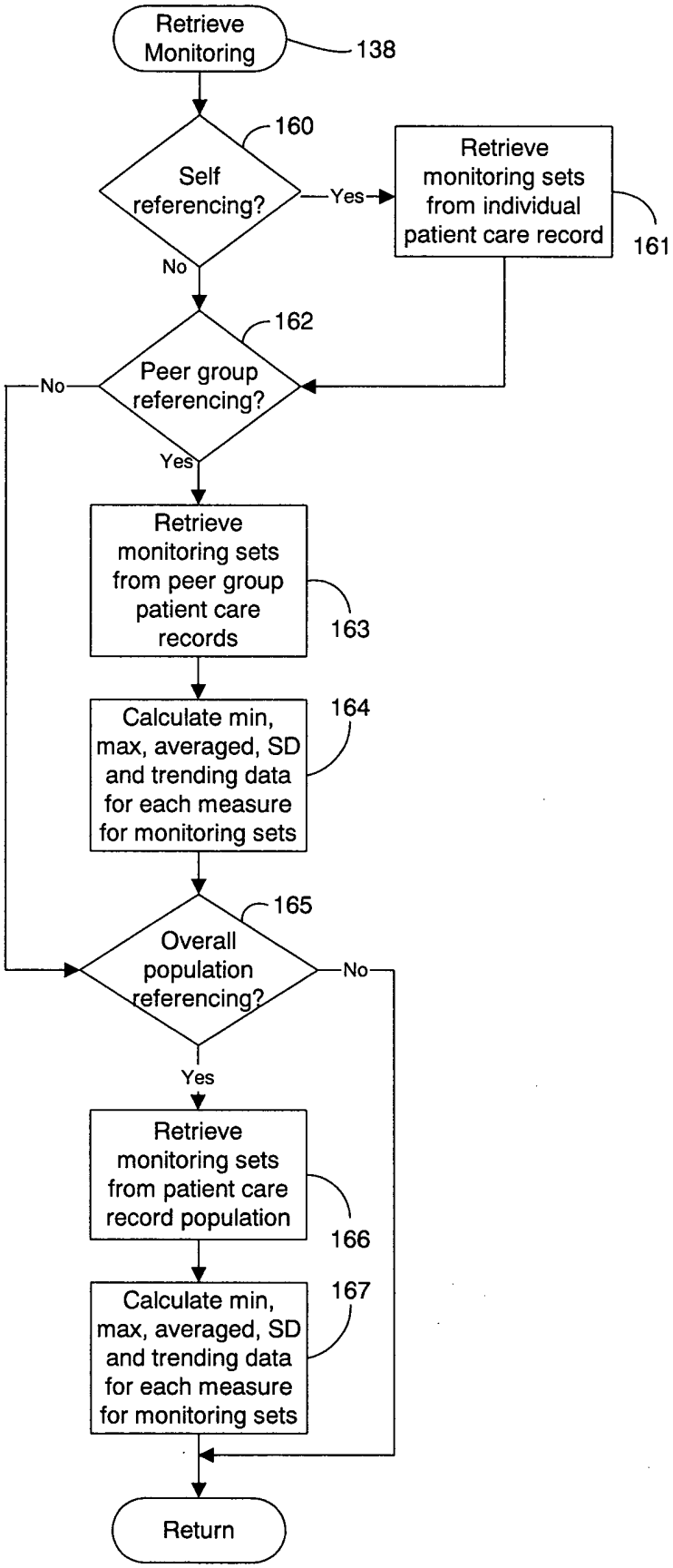

Retrieve Monitoring
138
160
Self referencing?
Yes
Retrieve monitoring sets from individual patient care record
161
No
162
Peer group referencing?
No
Yes
Retrieve monitoring sets from peer group patient care records
163
Calculate min, max, averaged, SD and trending data for each measure for monitoring sets
164
165
Overall population referencing?
No
Yes
Retrieve monitoring sets from patient care record population
166
Calculate min, max, averaged, SD and trending data for each measure for monitoring sets
167
Return

Figure 11A.

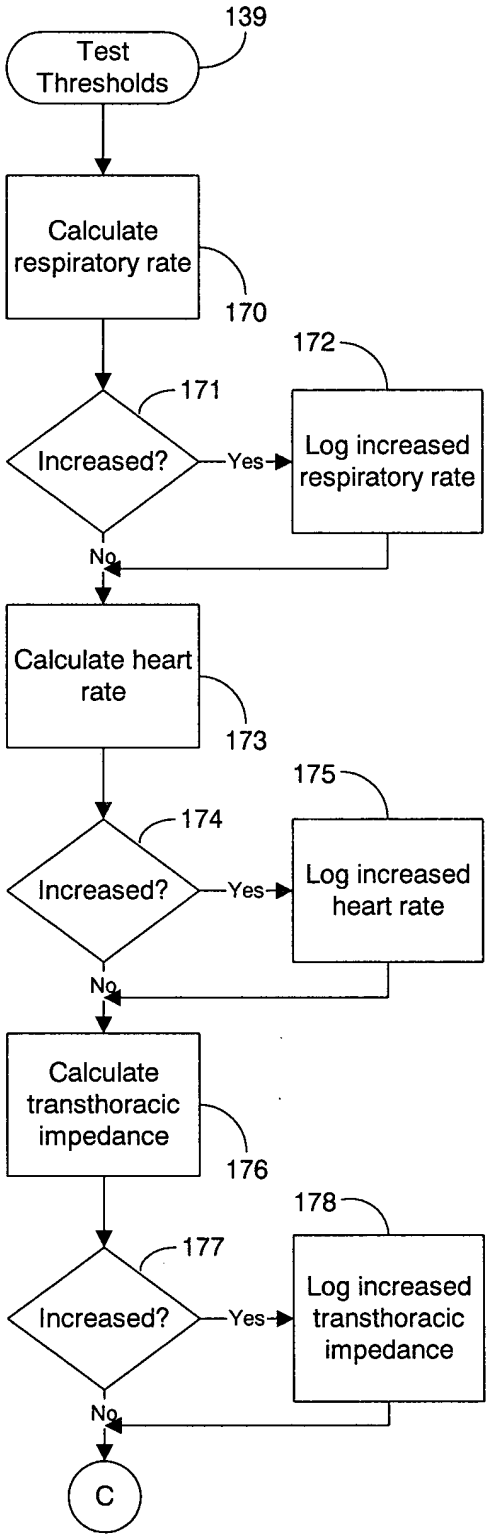

139
Test Thresholds
Calculate respiratory rate
170
172
171
Increased?
Yes
Log increased respiratory rate
No
Calculate heart rate
173
175
174
Increased?
Yes
Log increased heart rate
No
Calculate transthoracic impedance
176
178
177
Increased?
Yes
Log increased transthoracic impedance
No
C

Figure 11B.

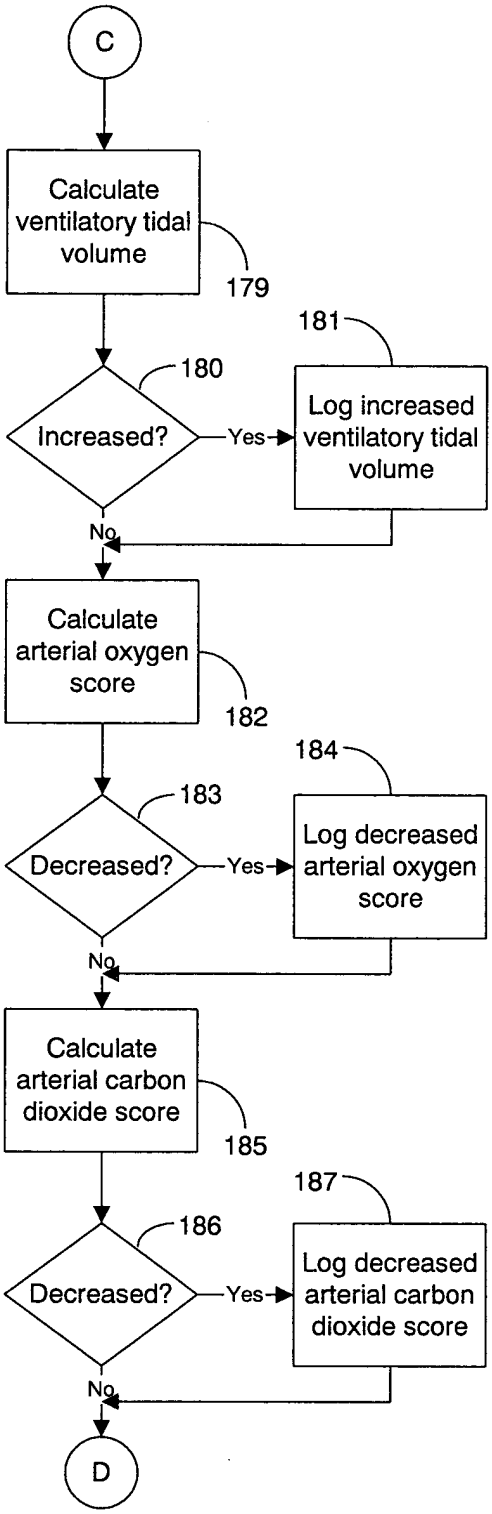

C
Calculate ventilatory tidal volume
179
181
180
Increased?
Yes
Log increased ventilatory tidal volume
No
Calculate arterial oxygen score
182
184
183
Decreased?
Yes
Log decreased arterial oxygen score
No
Calculate arterial carbon dioxide score
185
187
186
Decreased?
Yes
Log decreased arterial carbon dioxide score
No
D

Figure 11C.

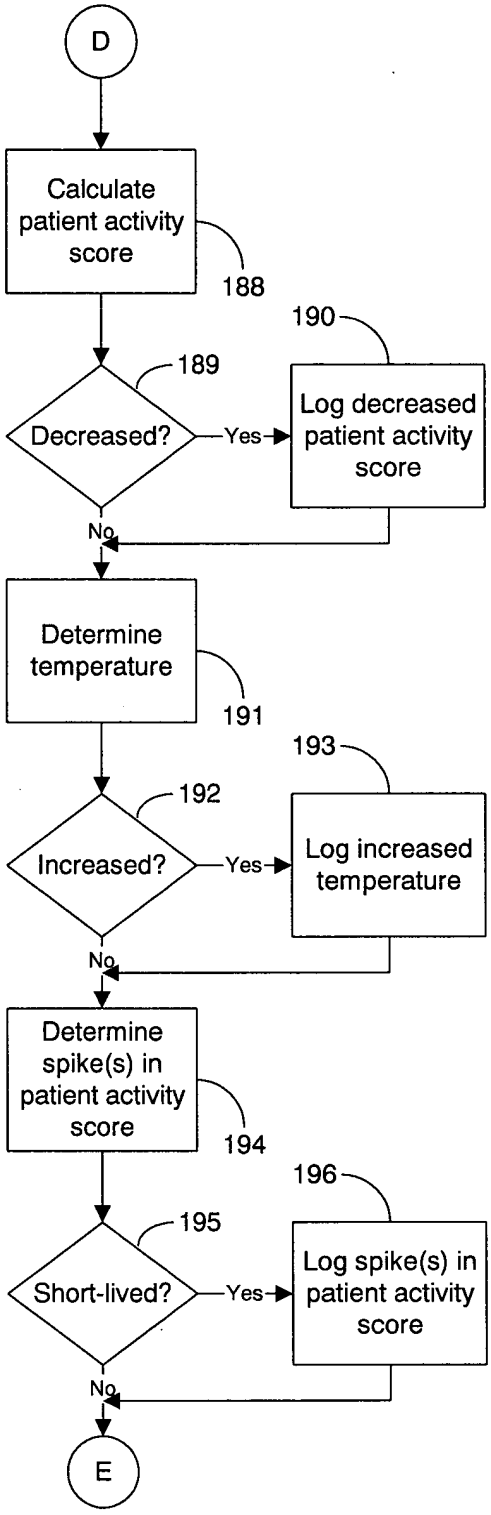

D
Calculate patient activity score
188
190
189
Decreased?
Yes
Log decreased patient activity score
No
Determine temperature
191
193
192
Increased?
Yes
Log increased temperature
No
Determine spike(s) in patient activity score
194
196
195
Short-lived?
Yes
Log spike(s) in patient activity score
No
E

Figure 11D.

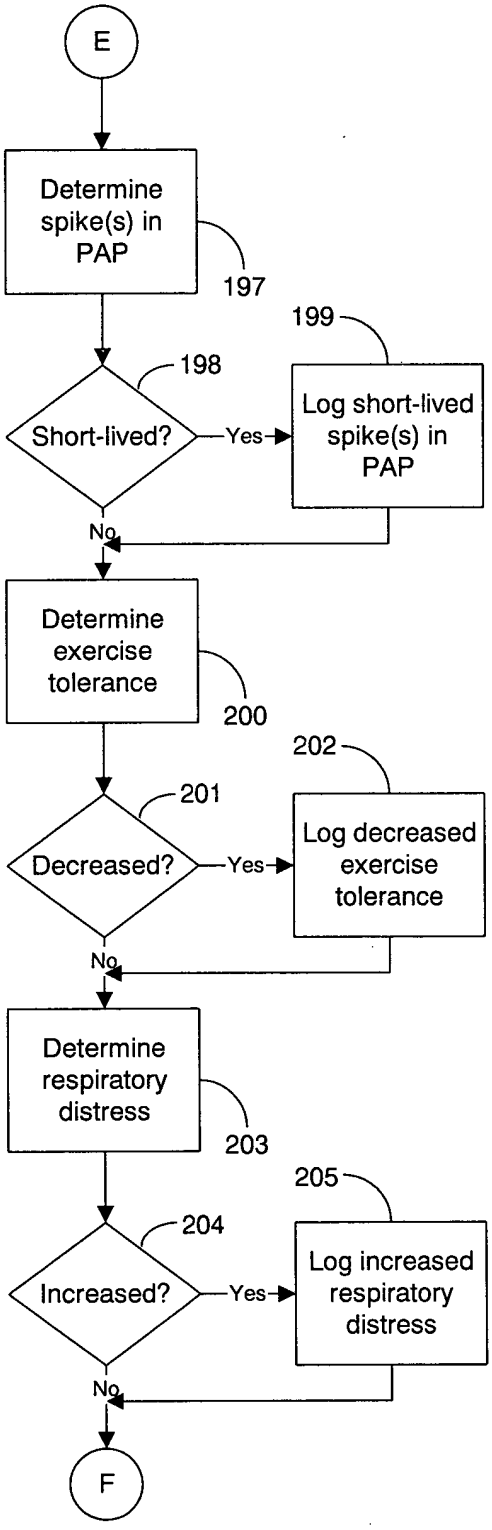

E
Determine spike(s) in PAP
197
199
198
Short-lived?
Yes
Log short-lived spike(s) in PAP
No
Determine exercise tolerance
200
202
201
Decreased?
Yes
Log decreased exercise tolerance
No
Determine respiratory distress
203
205
204
Increased?
Yes
Log increased respiratory distress
No
F

Figure 11E.

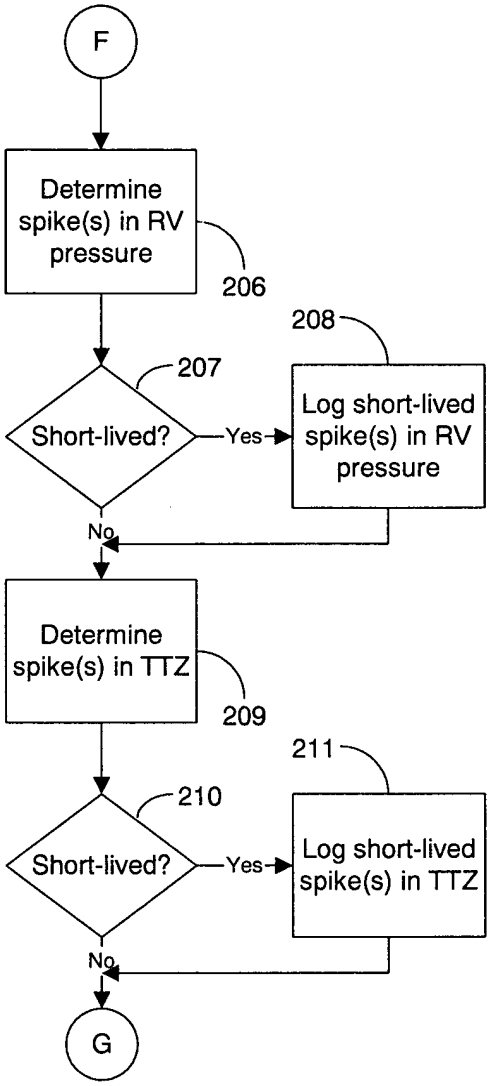

F
Determine spike(s) in RV pressure
206
208
207
Short-lived?
Yes
Log short-lived spike(s) in RV pressure
No
Determine spike(s) in TTZ
209
211
210
Short-lived?
Yes
Log short-lived spike(s) in TTZ
No
G

Figure 11F.

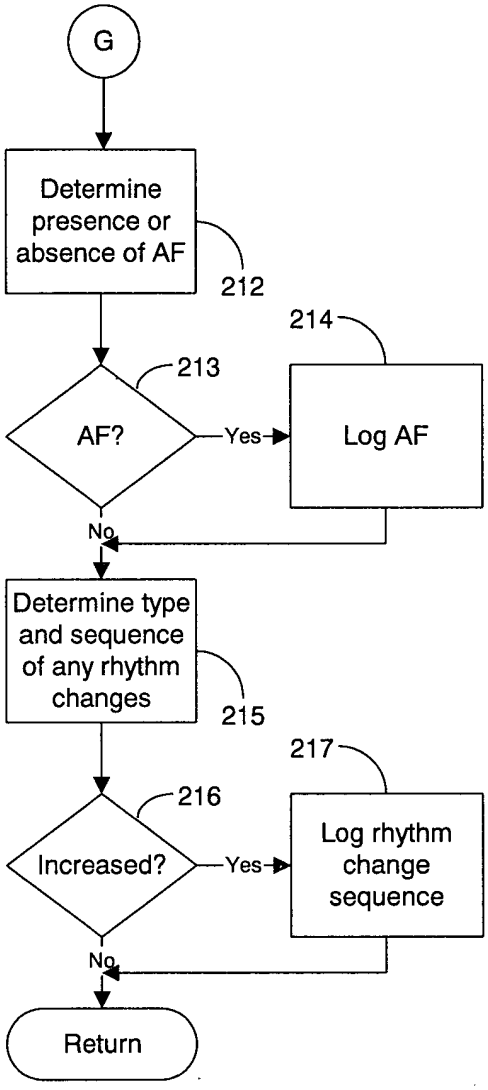

G
Determine presence or absence of AF
212
214
213
AF?
Yes
Log AF
No
Determine type and sequence of any rhythm changes
215
217
216
Increased?
Yes
Log rhythm change sequence
No
Return

Figure 12.

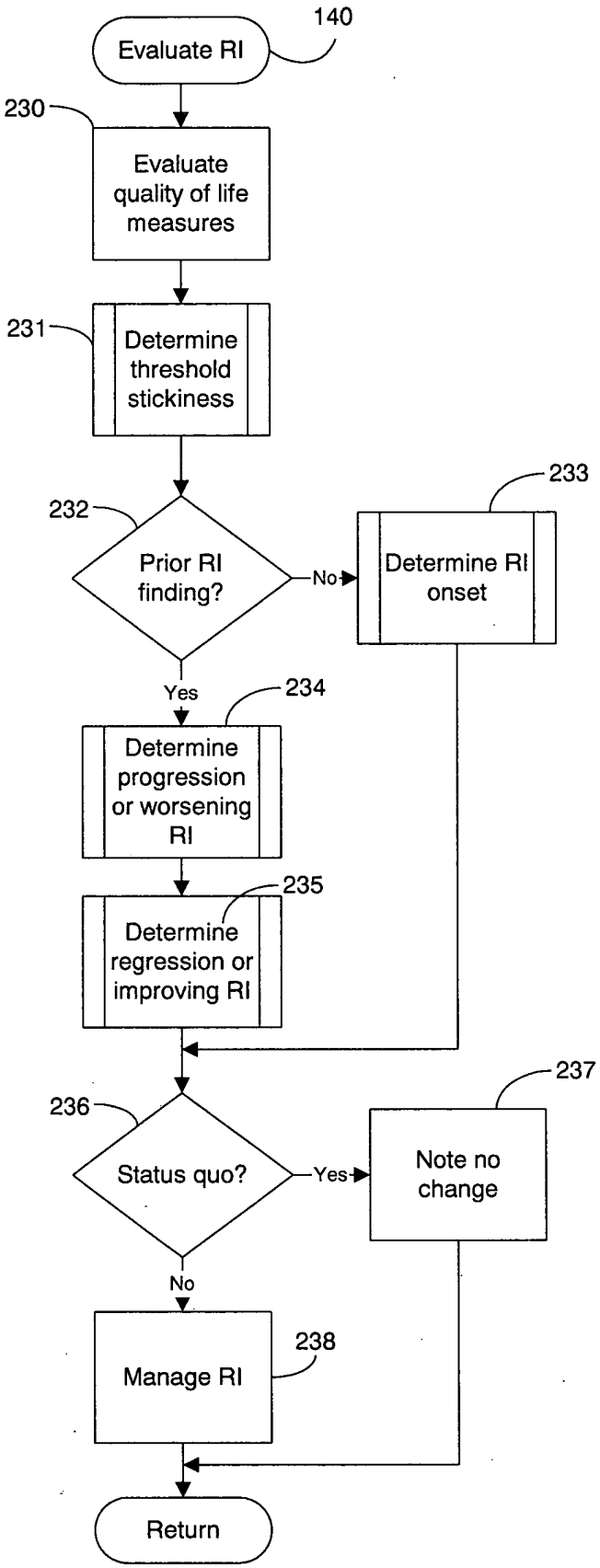

Evaluate RI
140
230
Evaluate quality of life measures
231
Determine threshold stickiness
232
Prior RI finding?
No
233
Determine RI onset
Yes
234
Determine progression or worsening RI
235
Determine regression or improving RI
236
Status quo?
Yes
237
Note no change
No
238
Manage RI
Return

Figure 13A.

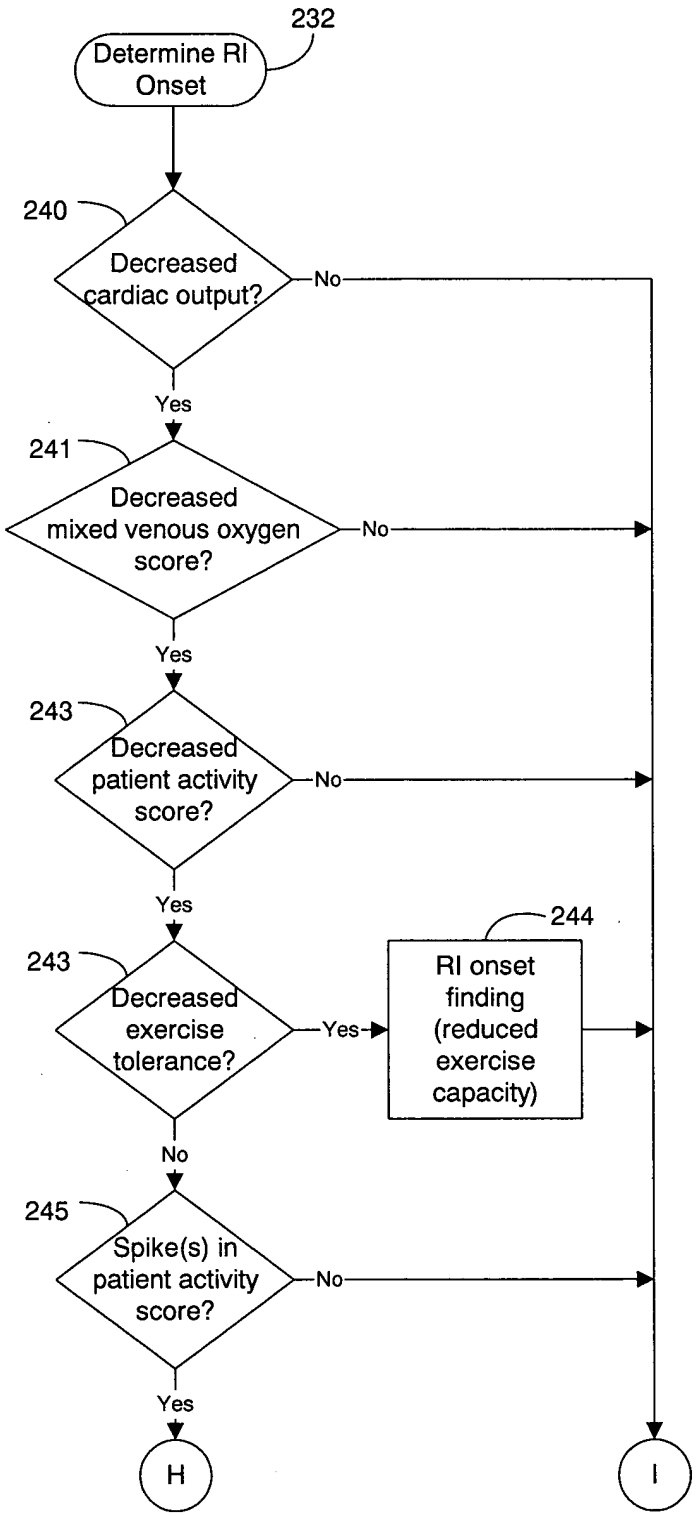

232
Determine RI Onset
240
Decreased cardiac output?
No
Yes
241
Decreased mixed venous oxygen score?
No
Yes
243
Decreased patient activity score?
No
Yes
244
243
Decreased exercise tolerance?
Yes
RI onset finding (reduced exercise capacity)
No
245
Spike(s) in patient activity score?
No
Yes
H
I

Figure 13B.

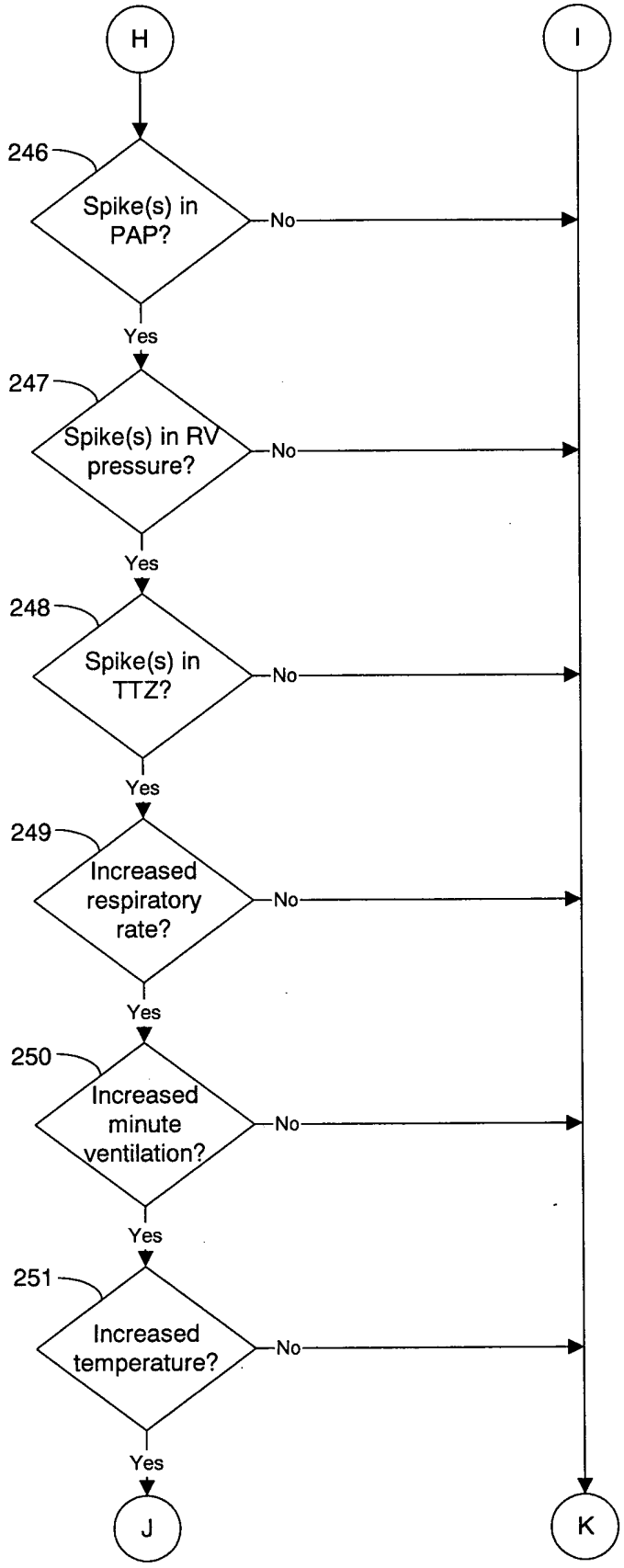

H
I
246
Spike(s) in PAP?
No
Yes
247
Spike(s) in RV pressure?
No
Yes
248
Spike(s) in TTZ?
No
Yes
249
Increased respiratory rate?
No
Yes
250
Increased minute ventilation?
No
Yes
251
Increased temperature?
No
Yes
J
K

Figure 13C.

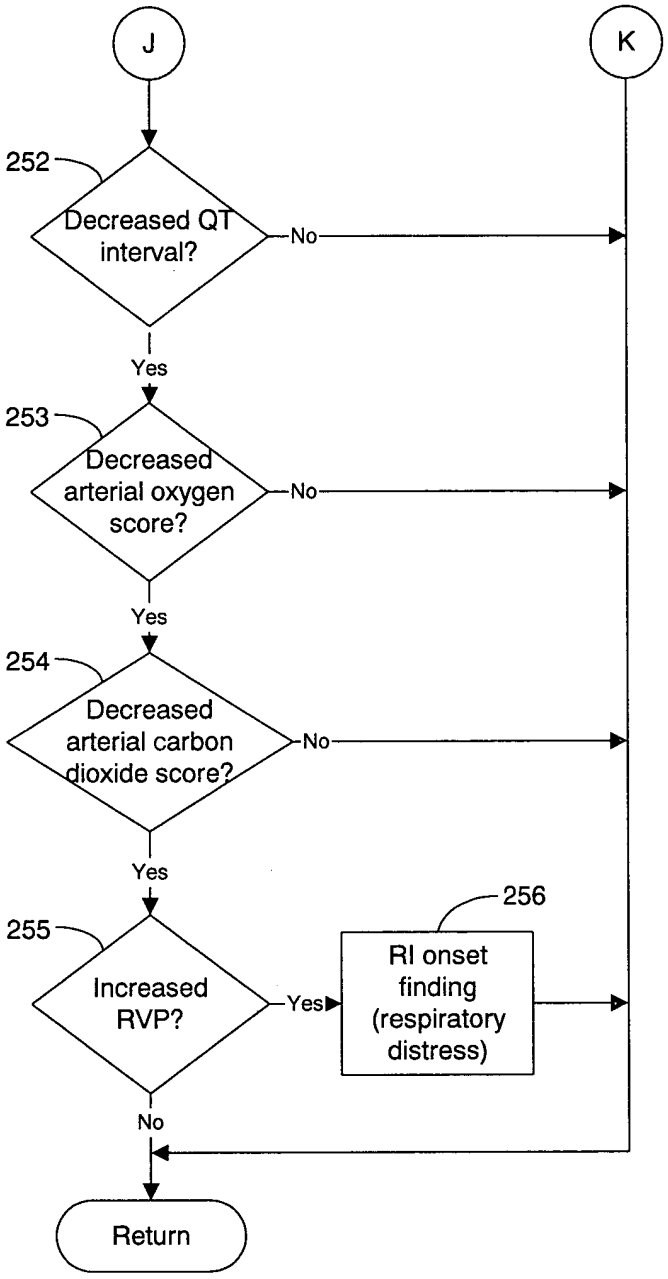

J
K
252
Decreased QT interval?
No
Yes
253
Decreased arterial oxygen score?
No
Yes
254
Decreased arterial carbon dioxide score?
No
Yes
255
Increased RVP?
Yes
256
RI onset finding (respiratory distress)
No
Return

Figure 14A.

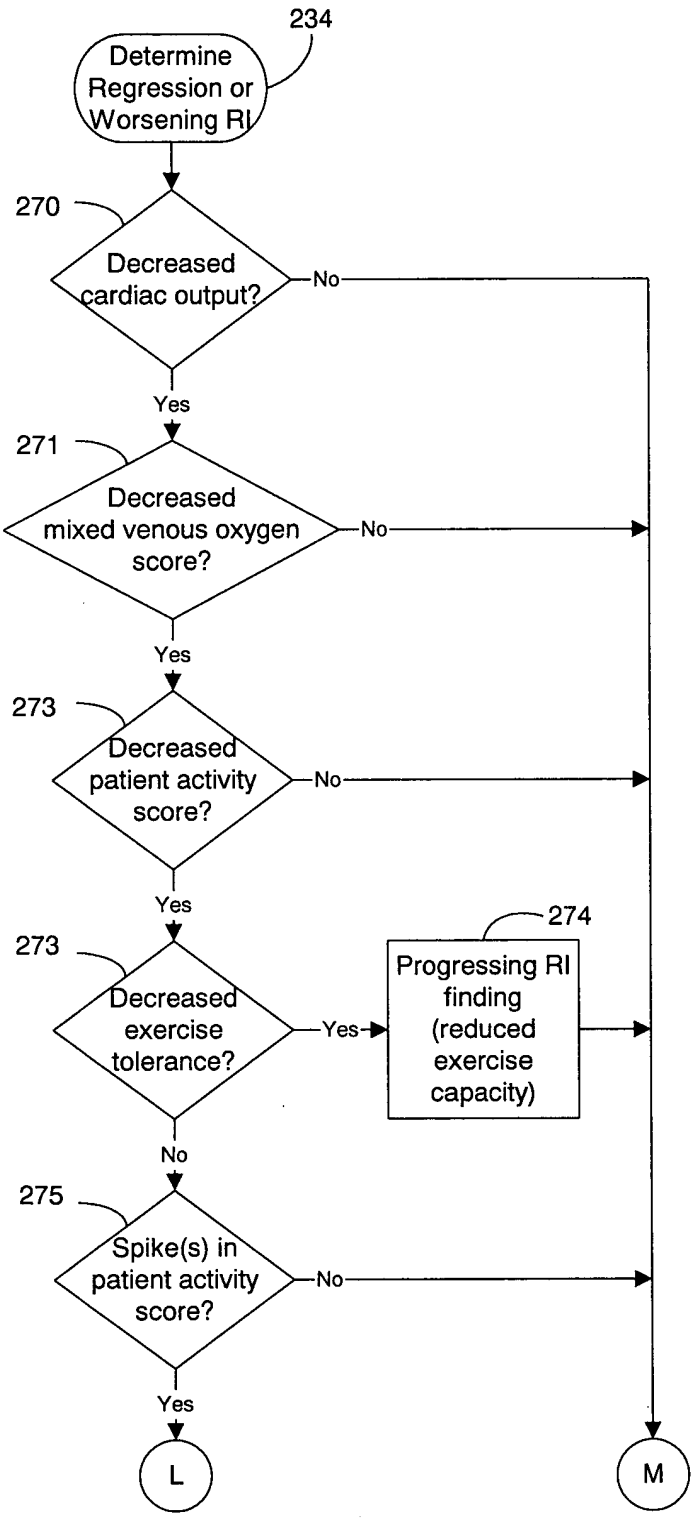

234
Determine Regression or Worsening RI
270
Decreased cardiac output?
No
Yes
271
Decreased mixed venous oxygen score?
No
Yes
273
Decreased patient activity score?
No
Yes
273
Decreased exercise tolerance?
Yes
274
Progressing RI finding (reduced exercise capacity)
No
275
Spike(s) in patient activity score?
No
Yes
L
M

Figure 14B.

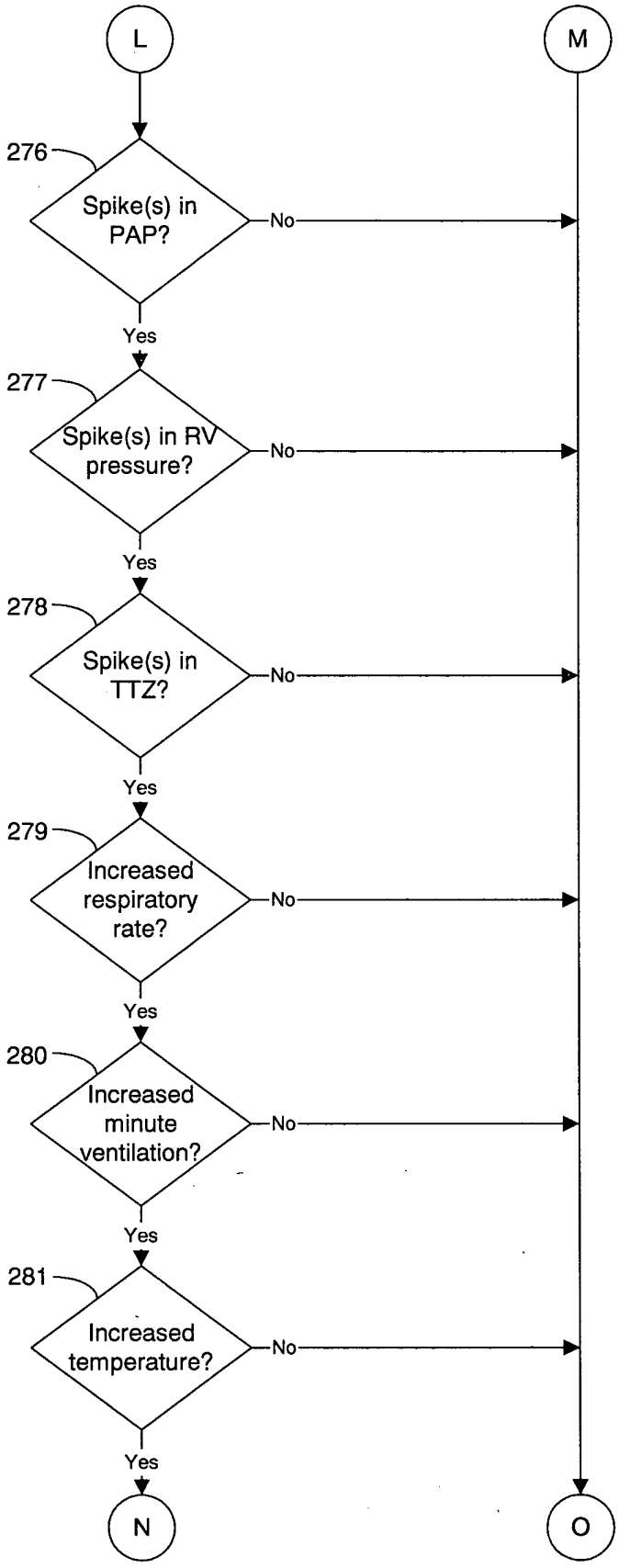

L
M
276
Spike(s) in PAP?
No
Yes
277
Spike(s) in RV pressure?
No
Yes
278
Spike(s) in TTZ?
No
Yes
279
Increased respiratory rate?
No
Yes
280
Increased minute ventilation?
No
Yes
281
Increased temperature?
No
Yes
N
O

Figure 14C.

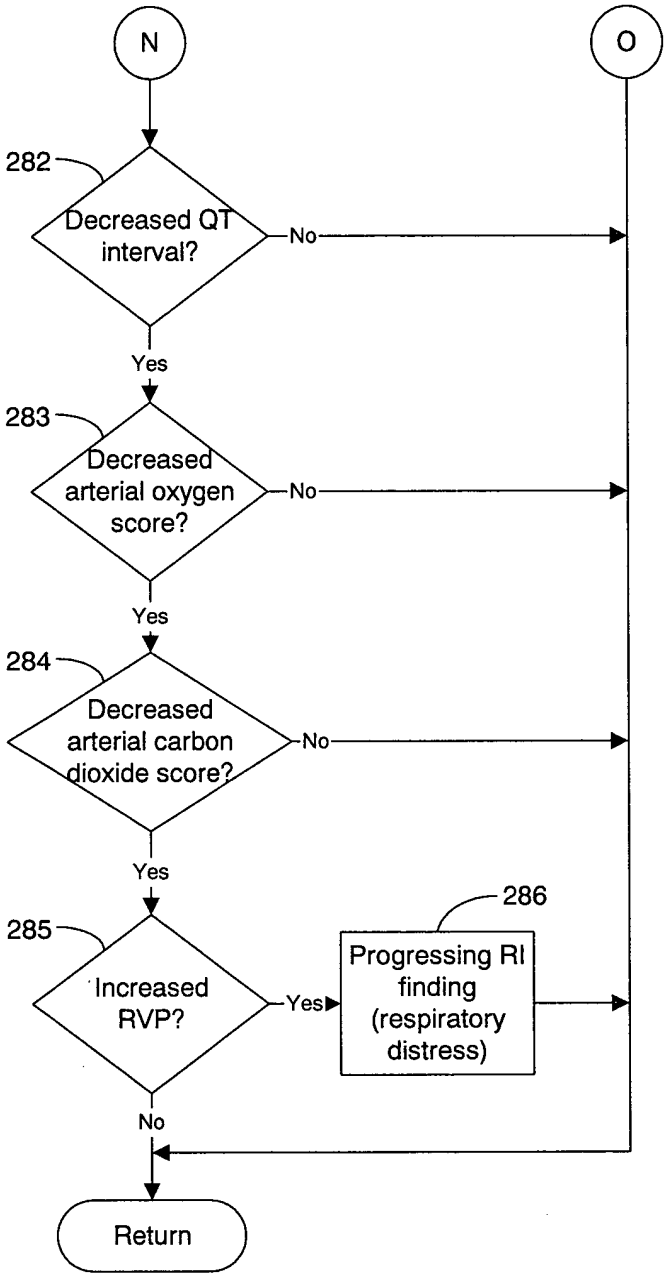

N
O
282
Decreased QT interval?
No
Yes
283
Decreased arterial oxygen score?
No
Yes
284
Decreased arterial carbon dioxide score?
No
Yes
285
Increased RVP?
Yes
286
Progressing RI finding (respiratory distress)
No
Return

Figure 15A.

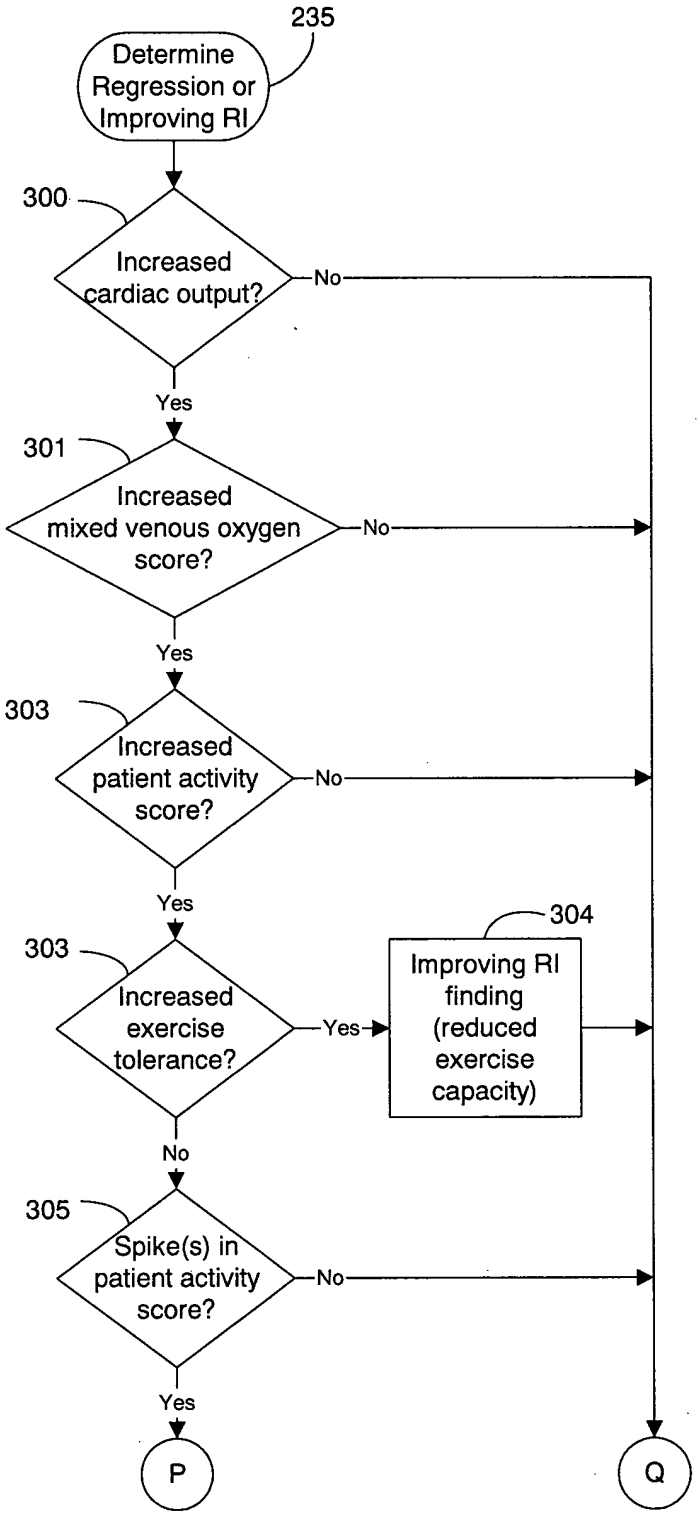

235
Determine Regression or Improving RI
300
Increased cardiac output?
No
Yes
301
Increased mixed venous oxygen score?
No
Yes
303
Increased patient activity score?
No
Yes
304
303
Increased exercise tolerance?
Yes
Improving RI finding (reduced exercise capacity)
No
305
Spike(s) in patient activity score?
No
Yes
P
Q

Figure 15B.

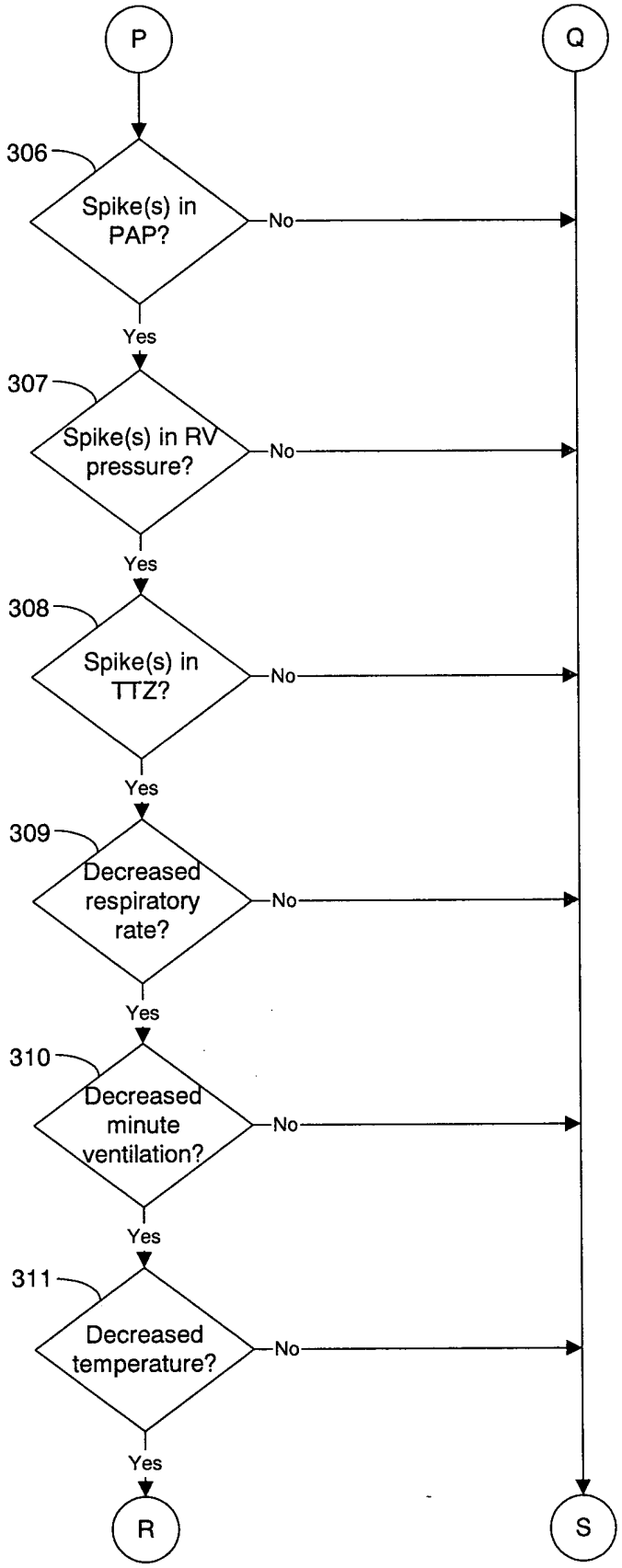

P
Q
306
Spike(s) in PAP?
No
Yes
307
Spike(s) in RV pressure?
No
Yes
308
Spike(s) in TTZ?
No
Yes
309
Decreased respiratory rate?
No
Yes
310
Decreased minute ventilation?
No
Yes
311
Decreased temperature?
No
Yes
R
S

Figure 15C.

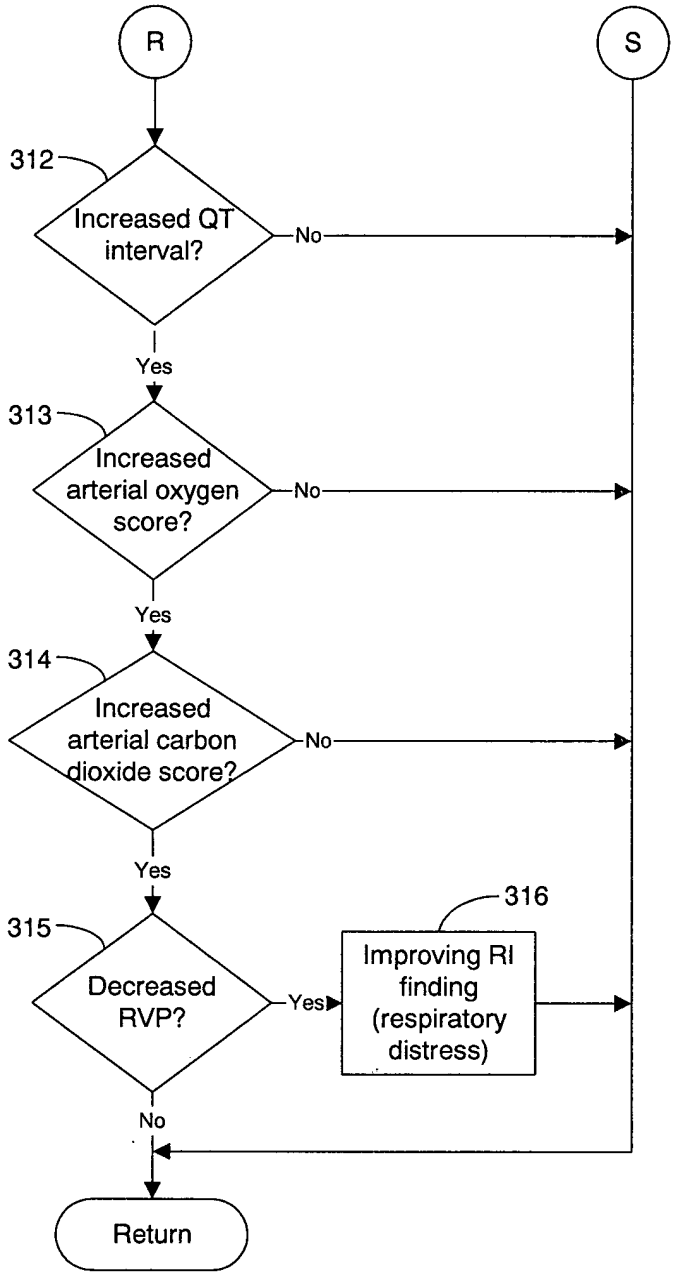
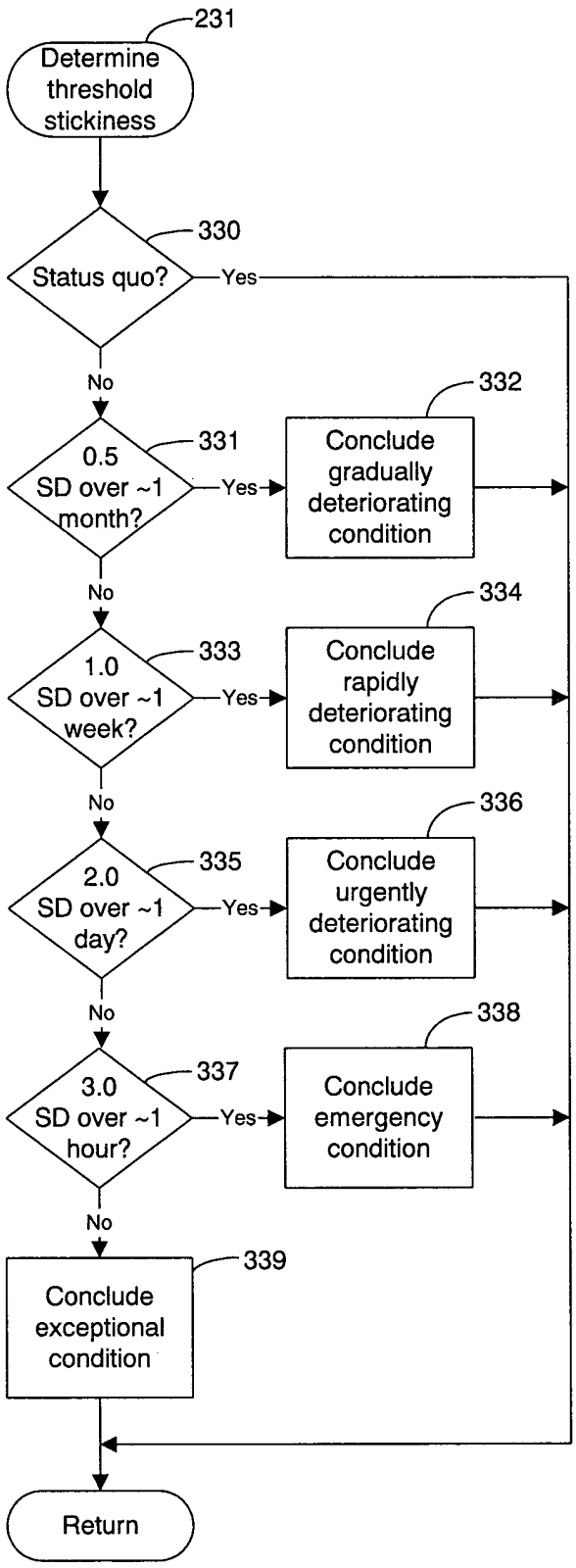

R
S
312
Increased QT interval?
No
Yes
313
Increased arterial oxygen score?
No
Yes
314
Increased arterial carbon dioxide score?
No
Yes
315
Decreased RVP?
Yes
316
Improving RI finding (respiratory distress)
No
Return

Figure 16.


231
Determine threshold stickiness
330
Status quo?
Yes
No
332
0.5 SD over ~1 month?
331
Yes
Conclude gradually deteriorating condition
No
334
1.0 SD over ~1 week?
333
Yes
Conclude rapidly deteriorating condition
No
336
2.0 SD over ~1 day?
335
Yes
Conclude urgently deteriorating condition
No
338
3.0 SD over ~1 hour?
337
Yes
Conclude emergency condition
No
339
Conclude exceptional condition
Return